
लेपित कागज़ और बोर्ड (कला और क्रोमो)
के लिए विशिष्टि
(दूसरा पुनरीक्षण)

Specification for Coated Paper and
Board (Art and Chromo)
(Second Revision)

ICS 85.060

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FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Paper and its Products Sectional Committee, had been approved by the Chemical Division Council.

This standard was first published in 1968 to define the quality of coated paper and boards (art and chromo). Art papers and boards are coated on both sides while chrome papers and boards are coated only on one side. These papers are generally used for fine decorative printing. This standard was first revised in 1988, where requirements on stiffness, Cobb value, smoothness and bulk had been incorporated with a view to upgrade the quality. Further, the burst factor had been replaced by burst index and modified coating mass requirement and prescribes test method for the same.

In this revision, product has been categorized in two varieties based on finish that is, 'Matt and Gloss' finish. Need for revision of this standard arises in view of the globalization and advancement in paper making, recent developments in the area of coating technology and printing technology. The requirement of bulk has been incorporated for coated paper also. This version has also given an opportunity to choose between 'matt finish' and 'gloss finish' paper based on their end uses. For determination of the printability of paper and paper board, roughness is an important parameter. Therefore, a new requirement namely smoothness/roughness (parker print surface) has been incorporated for both paper and board. The optional requirement of picking velocity have also been included. This revision amalgamates all the amendments published so far after review.

A scheme for labeling environment friendly products known as ECO Mark has been introduced at the instance of the Ministry of Environment, Forests and Climate Change (MEF&CC), Government of India. The ECO Mark would be administered by the Bureau of Indian Standards (BIS), under the *BIS Act*, 2016 as per the Resolutions No. 71 dated 21 February 1991 and No. 425 dated 28 October 1992 published in the Gazette of the Government of India. For a product to be eligible for marking with ECO logo, it shall also carry the ISI Mark besides meeting additional optional environment friendly requirements. For this purpose, the Standard Mark of BIS would be a single mark being a combination of the ISI mark and the ECO logo. Requirements to be satisfied for a product to qualify for the BIS Standard Mark for ECO friendliness is included in this Indian Standards. These requirements are optional; manufacturing units will be free to opt for the ISI mark alone also. This scheme is based on the Gazette Notification No. 455 dated 13 November 1992 for paper as environment friendly products published in the Gazette of India. This scheme is included to this standard to include environment friendly requirements for base paper for sensitized paper.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SPECIFICATION FOR COATED PAPER AND BOARD (ART AND CHROMO)

(*Second Revision*)

1 SCOPE

This standard prescribes the requirements, methods of sampling and test for coated paper and board (art and chromo), matt and gloss finish.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of and necessary adjuncts to this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 4661 and the following shall apply.

3.1 Gloss Finish — That property of a paper sheet surface that produces a shiny, highly-reflective appearance when light is reflected from it. While coating and thereafter calendaring on paper which gives the sheet a brighter reflection of light and that results in a shiny appearance.

3.2 Pick Resistance of Paper — This is defined as that property of surface layer which withstands the force of separation of sheet from the inked plate or blanket acting perpendicular to the surface of paper or board, which tends to rupture or break away surface fragments.

3.3 Picking Velocity of Paper — This is defined as the velocity of printing at which the picking of surface of the printed paper begins.

3.4 Smoothness, Parker Print Surface (PPS) — This is the mean gap between a sheet of paper or board and a flat when it is pressed against it under specified condition. It is expressed in microns.

4 TYPES

The material shall be of the following two types depending upon the finish:

- a) Gloss finish, or
- b) Matt finish.

5 REQUIREMENTS

5.1 General

The paper or board shall be uniform in thickness, generally free from holes, hard spots and lumps, shall lie flat and be dimensionally stable. The printing surface shall be smooth, of even finish, formation, absorbency and colour. Both sides in the case of art paper and board, and coated side in the case of chrome paper and board, shall be clean and free from loosely bound fibres and blister.

5.2 Tolerance on Thickness

When tested in accordance with 7 of IS 1060 (Part 1), the following tolerance shall be allowed on the nominal thickness:

- a) For Paper ± 3 percent; and
- b) For Board ± 5 percent.

5.3 Substance and Tolerance on Substance

The substance of the coated paper and board (art and chromo) shall be as agreed to between the purchaser and the supplier. A tolerance of ± 5 percent for coated paper and coated board shall be allowed on the nominal substance and average tolerance of ± 3 percent for coated paper and ± 4 percent for coated board shall be allowed when tested in accordance with 6 of IS 1060 (Part 1).

5.4 Sizes and Tolerance on Sizes

The sizes of the coated paper and the board shall be in accordance with IS 1064. The permissible tolerance shall be in accordance with 4 of IS 1064.

5.5 The coated paper and coated board shall also comply with the requirements given in Tables 1 and 2, respectively.

5.6 Additional Requirements for ECO Mark

5.6.1 General Requirements

5.6.1.1 The product shall conform to the requirements for quality and performance prescribed under clauses 5.1 to 5.5.

Table 1 Requirements for Coated Paper
(Clause 5.5)

Sl No.	Characteristics	Requirement Type		Method of Test Reference to			
		Gloss Finish	Matt Finish	Annex	Clause No. of IS 1060		Other
					(Part 1)	(Part 3)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Burst index kpa.m ² /g <i>Min</i>	0.9	0.9	—	—	—	IS 1060 (Part 6/Sec 2)
ii)	Wax Pick*	No pick on 5 A	No pick on 5 A	—	—	8	—
iii)	Picking velocity (optional), cm/sec <i>Min</i>	110	110	—	—	—	IS 1060 (Part 5/Sec 9)
iv)	Surface pH	7.0 - 8.0	7.0 - 8.0	—	—	9	—
v)	Gloss percent, Art paper	<i>Min</i> 65	<i>Max</i> 40	—	15	—	—
	Chromo paper	<i>Min</i> 65	<i>Max</i> 40	—		—	
vi)	Brightness (on coated side), <i>Min</i>	86	86	—	—	—	IS/ISO 2470 (Part 1)
vii)	Smoothness PPS, µm <i>Max</i>	1.5	2.5	B	—	—	—
viii)	Bulk, cc/g, <i>Min</i>	0.77	0.87	—	8	—	—
ix)	Cobb value, g/m ² , <i>Max</i>						
	Art board: (Coated side)	35	35	—	—	—	IS 1060 (Part 5/Sec 4)
	Chromo board: (Coated side)	35	35				

*Not applicable when synthetic resin is used.

Table 2 Requirements for Coated Board
(Clause 5.5)

Sl No.	Characteristics	Requirement Type		Method of Test Reference to			
		Gloss Finish	Matt Finish	Annex	Clause No. of IS 1060		Other
					(Part 1)	(Part 3)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Burst index, kpa.m ² /g, <i>Min</i>	0.8	0.8	—	—	—	IS 1060 (Part 7/Sec 1)
ii)	Wax Pick*	No pick on 5 A	No pick on 5 A	—	—	8	—
iii)	Picking velocity (Optional), cm/sec, <i>Min</i>	110	110	—	—	—	IS 1060 (Part 5/Sec9)
iv)	Surface pH	7.0 - 8.0	7.0 - 8.0	—	—	9	—
v)	Gloss percent, Art board	<i>Min</i> 65	<i>Max</i> 50	—	15	—	—
	Chromo board	<i>Min</i> 65	<i>Max</i> 50	—		—	
vi)	Brightness (on coated side), <i>Min</i>	86	86	—	—	—	IS/ISO 2470 (Part 1)
vii)	Smoothness PPS, µm <i>Max</i>	2.0	2.5	B	—	—	—
viii)	Stiffness factor, <i>Min</i>	175	175	C	—	—	—
ix)	Cobb value, g/m ² , <i>Max</i>						
	Art board: (Coated side)	35	35	—	—	—	IS 1060 (Part 5/Sec 4)
	Chromo board: (Coated side)	35	35				
x)	Bulk, cc/g, <i>Min</i>			—	8	—	—
	Art board	0.8	0.9				
	Chromo board	1.0	1.1				

*Not applicable when synthetic resin is used.

5.6.1.2 The manufacturer shall produce to BIS, the environmental consent clearance from the concerned State Pollution Control Board as per the provisions of *Water (Prevention and Control of Pollution) Act, 1974* and *Air (Prevention and Control of Pollution) Act, 1981* along with the authorization, if required, under the *Environment (Protection) Act, 1986* and the rules made there under, while applying for ECO Mark.

5.6.2 Product Specific Requirements

- The paper and paper boards manufactured out of pulp containing not less than 60 percent by weight of pulp made from materials other than bamboo, hardwoods, softwoods and reed.
- Recycled paper and paper board must be made from 100 percent waste paper.

6 PACKING AND MARKING

6.1 Packing

The packing of paper or board shall be done so as to ensure that the paper or board is not damaged due to handling and transportation (*see* IS 6211) and shall be as agreed to between the purchaser and the supplier.

6.1.1 For ECO Mark, the product shall be packed in such packages which shall be recyclable/reusable or biodegradable.

6.2 Marking

6.2.1 Each package shall be marked with the following:

- a) Description and substance in g/m² of the paper or board;
- b) Size of the paper or board in the package;
- c) In the case of sheets, the mass in kg per ream of 500/250/125/100 sheets including the wrapping paper when determined in accordance with the method prescribed in Annex D;
- d) Lot number;
- e) Month and year of manufacture; and
- f) Manufacturer's name or recognized trademark; if any.

6.2.2 BIS Certification Marking

The packages may also be marked with the Standard Mark.

6.2.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations made there under. The details of conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6.2.3 Additional Requirements for ECO Mark

For ECO Mark, following additional information may also be marked on the container/package:

- a) The criteria based on which the product has been labelled with ECO Mark;
- b) The paper shall be sold along with instructions for proper use and mode of safe disposal so as to maximize its performance and minimize wastage; and
- c) It shall be marked that the ECO-Mark is applicable to the coated paper and board only if packaging material is not separately covered under the ECO Mark scheme (*see* note below).

NOTE — It may be stated that the ECO-Mark is either applicable to the coated paper and board or packaging material or both.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 Sampling

Representative samples for tests shall be drawn as prescribed in 3 of IS 1060 (Part 1).

7.2 Number of Tests

From each of the packets selected from the lot (*see* 7.1), one sheet shall be taken out at random. These sheets shall constitute the sample. The sheets selected shall first be tested for the general requirements given in 5.1. One test piece shall be cut from each selected sheet and for each of the characteristics mentioned in Table 1 and 2, 5.1 and 5.4 and tested. A sheet not meeting the requirements for any one or more characteristics shall be considered as defective.

7.3 Criterion for Conformity

A lot shall be declared as conforming to all the requirements of this specification if the number of defective sheets found does not exceed the acceptance number. This acceptance number shall depend upon the size of the sample and shall be zero if the size is less than 13 and one if it is greater than or equal to 13.

8 TEST METHODS

8.1 Tests shall be conducted in accordance with the methods referred to in col. 5, 6, 7 and 8 of the Table 1 and 2.

8.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
1060 (Part 1) : 1966	Methods of sampling and test for paper and allied products: Part 1 (<i>revised</i>)	1060 (Part 7/ Sec 1) : 2014/ ISO 2759 : 2001	Methods of sampling and test for paper and allied products: Part 7 Methods of test for board, Section 1 Determination of bursting strength of board
1060 (Part 3) : 1969	Methods of sampling and test for paper and allied products: Part 3	1064 : 1980	Specification for paper sizes (<i>second revision</i>)
1060 (Part 5/ Sec 4) : 2014/ ISO 535 : 1991	Methods of sampling and test for paper and allied products: Part 5 Methods of test for paper and board, Section 4 Determination of water absorptiveness — Cobb method	1070 : 1992	Reagent grade water (<i>third revision</i>)
1060 (Part 5/ Sec 9) : 2014/ ISO 3783 : 2006	Methods of sampling and test for paper and allied products: Part 5 Methods of test for paper and board, Section 9 Determination of resistance to picking — Accelerated speed method using the IGT-type tester (Electric model)	IS/ISO 2470-1 : 2009	Paper, board and pulps — Measurement of diffuse blue reflectance factor: Part 1 Indoor daylight conditions (ISO brightness)
1060 (Part 6/ Sec 2) : 2014/ ISO 2758:2001	Methods of sampling and test for paper and allied products: Part 6 Methods of test for paper, Section 2 Determination of bursting strength of paper	4661 : 1999	Glossary of terms used in paper trade and industry (<i>second revision</i>)
		6211 : 1993	Code of practice for packaging of paper and board (<i>first revision</i>)
		9894 : 1981	Methods of test for smoothness/ roughness of paper

ANNEX B

[Table 1, Sl. No. (vii) and Table 2, Sl. No. (vii)]

METHOD FOR DETERMINATION OF SMOOTHNESS/ROUGHNESS OF PAPER AND PAPERBOARD (PPS)

B-1 GENERAL

For determination of suitability of printing of paper and paper board, roughness is an important parameter. This method is used for determination of the roughness of paper and paperboard under conditions intended to simulate the nip pressures and backing substrates found in printing processes. PPS surface roughness is the mean distance of a test piece from a land against which the test piece is pressed. The mean distance is taken to be the cube root of the distance between each point in the paper's surface and the measurement land against which the sample is pressed. The test results are expressed directly as an average value of roughness in micrometers, which

in many cases correlates better with printability than other comparable methods.

B-2 APPARATUS**B-2.1 PPS Tester****B-2.1.1 Air Supply**

A compressed clean air, free of oil and water droplets, at constant pressure ranging from 300 kPa(43 lb/in²) to 600 kPa (86 lb/in²).

B-2.1.2 Measuring Head

A circular head of the form consisting of three steel lands which have coplanar, polished surfaces. The

center or measuring land shall be $51.0 \mu\text{m} \pm 1.5 \mu\text{m}$ wide and have an effective length of $98.0 \pm 0.5 \text{ mm}$. The two guard lands, each shall be at least $1\,000 \mu\text{m}$ wide at any point and the radial distance between them at any point shall be $152 \mu\text{m} \pm 10 \mu\text{m}$. The measuring land shall be centered between them to within $\pm 10 \mu\text{m}$. The lands shall be fixed in an airtight mounting constructed so that air can be passed into the gap between the inner guard land and the measuring land and exhausted from the gap between the measuring land and the outer guard land.

B-2.2 Sensing Head Air Pressure Regulator

The sensing head shall be supplied with air regulator at a known differential pressure. Latest instruments employing electronic flow measurement techniques may require different differential pressure settings and tolerances describe in the operating manual.

B-2.3 Resilient Backings

Two types of resilient backings are normally available for use in pressing the test piece against the sensing head.

B-2.3.1 Hard Backing

A hard backing should be used for paper-clad counter pressure roll for printing of paper using letterpress printing procedure. A layer of polyester film bonded at its periphery to cork, offset blanket or similar material (assembly hardness should be $95 \pm 2 \text{ IRHD}$) and should have hole in the center. The backing should have double sided adhesive tape so that it may fixed to the backing holder.

B-2.3.2 Soft Backing

For most other paper and printing methods soft backing should be used. It is a rubber offset printing blanket composed of a layer of synthetic rubber at least $600 \mu\text{m}$ thick, bonded to a fabric backing giving thickness of $2\,000 \mu\text{m} \pm 200 \mu\text{m}$ (assembly hardness should be $83 \pm 6 \text{ IRHD}$). This backing should also have double sided adhesive tape for proper fixing to the backing holder.

B-2.4 Clamping Plate with Backing

There are two lower clamping plates for measuring roughness and compressibility one with a soft backing and another with a hard backing. A clamping mechanism allows clamping of the test specimen between the backing and the sensing head during

the measurement cycle. The clamping pressures that is, measurement pressure (MP) $19.6 \pm 2 \text{ kPa}$, clamping low pressure (CLP) $40 \pm 2 \text{ kPa}$, clamping medium pressure (CMP) $76 \pm 3 \text{ kPa}$, and clamping high pressure (CHP) $146 \pm 3 \text{ kPa}$ should be checked and adjusted before performing the calibration and testing.

B-2.5 Measuring System

Any measuring system may be employed which is able to measure the flow of air between the measuring land and the clamped test piece.

B-3 CALIBRATION

The calibration procedure should be employed as per the guidelines of instrument operating manual and the supplied calibrating kits with the instrument.

B-4 TEST SPECIMEN AND CONDITIONING

Test specimen shall be cut from the sample in such a way so that same should truly represent the sample. The minimum area of test specimen shall be 100 cm^2 . A minimum number of ten test pieces is required for each side. The test area shall be free of all folds, wrinkles, holes and other defects and should not include watermarks. Condition all the test specimens as prescribed in 5 of IS 1060 (Part 1).

B-5 PROCEDURE

B-5.1 Instrument should be placed at vibration free uniform platform. Use suitable backing disc as per the specimen to be tested.

B-5.2 Insert the test specimen between the instrument measuring head and base plate with backing and side to be tested facing upwards. Perform the test in accordance with the instructions given in the instruction manual supplied along with the instrument. Most electronic type instruments make the measurement and calculate and display the roughness automatically.

B-5.3 Repeat step **B-5.2** for each of the other test specimens and calculate the arithmetic mean and standard deviation of both side of the specimen.

B-6 REPORT

Report the average of the test results for each side tested in microns as smoothness/roughness.

ANNEX C

[Table 2, Sl. No. (viii)]

TEST FOR STIFFNESS

C-1 OUTLINE OF THE METHOD

Measurement of the force required to bend a test piece clamped at one end through a given angle, the force being applied at a constant distance from the line of clamping.

C-2 APPARATUS

C-2.1 Any system may be used that is capable of acting on the test piece to measure the bending force to a degree of precision in accordance with the specification for instrument accuracy.

C-2.2 The clamp should grip the test piece across its full width and length direction not less than 12.7 mm when test pieces are inserted. The free end of test piece should not be restrained unless the friction imposed on its surface by the indenter.

C-2.3 The nominal bending length is 10 mm. Such bending length allows the use of several types of instruments that have been found satisfactory. For the most accurate work, however, the results shall be corrected for differences in the nominal bending length.

C-2.4 The instrument employed shall comply with the following requirements, within the given limits of accuracy:

- a) Bending angle $15.0 \pm 1^\circ$;
- b) Bending length 50.0 ± 2.5 mm;
- c) Rate of bending such that a bending angle of 15° is reached in not less than 3 seconds and not more than 20 seconds. It is essential that bending during the test is continuous and the rate of bending should be reasonably constant; and
- d) Scale readings accurate to ± 2 percent on the appropriate range.

C-2.5 Equipment for the cutting of the test piece to the required accuracy is also needed. This may consist of a knife and a template, a guillotine or a punch.

C-3 PROCEDURE

C-3.1 Select units and sheets and take the specimens according to 3 of IS 1060 (Part 1).

C-3.2 The samples shall be conditioned in accordance with 5 of IS 1060 (Part 1) and sample preparation and testing shall be carried out in the standard atmospheric condition (that is, $27^\circ\text{C} \pm 2^\circ\text{C}$, 65 percent ± 5 percent RH).

C-3.3 Cut test pieces of 38.0 ± 0.2 mm wide and 75 ± 5 mm length. A minimum number of ten test pieces are required for each test direction. There shall be no folds, creases, visible cracks or other defects on the area to be tested and the test piece shall not include any part of the sample that is less than 15 mm from the edge of the sheet or reel. If watermarks are present, same should be clearly stated in the test report.

NOTE — When testing the machine direction or cross direction stiffness of the paper, the appropriate direction is perpendicular to the clamped width of the test piece.

C-3.4 Carry out the operations involved in measurement of stiffness of each test piece in the manner recommended for the type of instrument in use (see C-2.4).

C-3.5 Clamp the test piece in the holder in such a manner that the length that projects beyond the clamp (the free length) shall be 10 ± 3 mm and the test piece is correctly aligned.

C-3.6 Ensure the standard bending angle is 15° .

C-3.7 Deflect each test piece at an angle of 15° to one side of the unstressed position and then immediately return the test piece to its original position (zero position), then again deflect it at an angle of 15° to the opposite side. In each direction, take the reading as soon as 15° deflection has been reached. If the instrument designed is such that deflection is possible to one side only, then equal number of test pieces with opposing surfaces towards the direction of deflection should be tested. In such cases, care should be taken to ensure integrity of side of the sample. No test piece shall be re-used after it has been removed from the instrument clamp.

C-3.8 When each test piece is deflected to both sides of the unstressed position, ten test pieces and twenty readings are required. For instruments in which each test piece is deflected to only one side of the unstressed position, twenty test pieces and twenty readings are required. Where a distinct partial fracture or considerable permanent deformation of the test piece occurs during a test, the results of this test shall be ignored.

C-4 CALCULATIONS AND EXPRESSION OF RESULTS

Calculate the arithmetic mean of the twenty readings and express the result as stiffness factor. For instruments giving readings of stiffness in Newton, the result may

be expressed by dividing the reading in Newton by 9.81×10^{-3} . For instruments giving readings as values of bending moment in gram force centimeters (sometimes called 'Units' or 'Taber units') the result may be expressed as stiffness factor by dividing the value by 9.81×10^{-3} and the bending length in centimeters. For the most accurate work, the effect of the precise bending length used on the stiffness shall be taken into account. Hence,

$$\text{Stiffness} = \frac{L^2}{2500} \times \text{measured bending force}$$

Where,

L = bending length, in mm.

C-5 TEST REPORT

The test report shall include the following particulars, results being given separately for machine direction and cross direction tested:

- a) Description and identification of the material tested;
- b) The type of instrument used;
- c) The direction of the test;
- d) The number of replicate tests carried out if other than ten (or twenty); and
- e) The mean stiffness factor.

ANNEX D

[Clause 6.2.1 (c)]

DETERMINATION OF NOMINAL MASS OF REAM

The nominal mass of ream of paper shall be calculated according to the following formula: where,

$$R = \frac{(A \times B \times C) + D}{1000}$$

R = nominal mass of reams of paper, in kg;

A = nominal substance of paper, in g/m²;

B = nominal number of sheets of paper in a ream;

C = nominal area of each sheet, in m²; and

D = nominal mass of wrapping paper, in g.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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